

<b>Interview Summary</b>	<b>Application No.</b> 09/780,184	<b>Applicant(s)</b> GITTLEMAN ET AL.	
	<b>Examiner</b> Basia Ridley	<b>Art Unit</b> 1764	

All participants (applicant, applicant's representative, PTO personnel):

- (1) Basia Ridley. (3) \_\_\_\_.
- (2) Jennifer Woodside-Wojtala (Reg. No. 50721). (4) \_\_\_\_.

Date of Interview: 19 April 2005.

Type: a) ☐ Telephonic b) ☐ Video Conference  
c) ☒ Personal [copy given to: 1) ☐ applicant 2) ☒ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.  
If Yes, brief description: \_\_\_\_.

Claim(s) discussed: 48 and 49.

Identification of prior art discussed: \_\_\_\_.


Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The applicant proposed an amendment to claims 48-49, which appears to overcome the rejection of record (see attachment). The examiner noted that said amendment would require further consideration and search.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

  
PRIMARY EXAMINER 1764  
Examiner's signature, if required

## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

#### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

**PROPOSED DRAFT AMENDMENTS TO THE CLAIMS**

**09/780,184 to Gittleman, et al.**

April 19, 2005

1. (cancelled).
2. (previously presented) The system as defined in claim 47 wherein the vessel is a pressure swing adsorber.
3. (original) The system as defined in claim 2 wherein the pressure swing adsorber comprises multiple, staged fixed beds.
4. (original) The system as defined in claim 2 wherein the pressure swing adsorber is a rotating vessel.
5. (original) The system as defined in claim 4 wherein the rotating vessel comprises:
  - an adsorption region;
  - a depressurization region;
  - a purge region; and
  - a pressurization region.
6. (original) The system as defined in claim 4 wherein the rotating vessel comprises two fixed valve faces.

7. (previously presented) The system as defined in claim 49 which is a fuel cell system.

8. (previously presented) The system as defined in claim 47 wherein at least one of the first and second adsorbent is selected from the group consisting of 5A zeolite, 13X zeolite, and mixtures thereof.

9. (previously presented) The system as defined in claim 47 wherein at least one of the first and second adsorbent is selected from the group consisting of: oxides or salts of copper impregnated or exchanged on activated carbon, alumina, and zeolites; oxides or salts of silver impregnated or exchanged on activated carbon, alumina, and zeolites; oxides or salts of tin impregnated or exchanged on activated carbon, alumina, and zeolites; and mixtures thereof.

10. (previously presented) The system as defined in claim 47 wherein, upstream of the second carbon monoxide adsorbent, the vessel comprises a layer of a desiccant material.

11. (original) The system as defined in claim 10 wherein the desiccant material is selected from the group consisting of zeolite molecular sieves, activated alumina, silica gels, and mixtures thereof.

12-13. (cancelled)

14. (previously presented) The system of claim 49 wherein the water gas shift reactor is a high temperature water gas shift reactor.

15. (cancelled).

16. (previously presented) The system as defined in claim 47 which further comprises an expander downstream of the vessel, and wherein the expander provides a purge gas to be fed back into the vessel.

17. (original) The system as defined in claim 16 which further comprises a fuel cell stack having an anode exhaust, the fuel cell stack disposed between the vessel and the expander, and wherein the expander expands the anode exhaust, the expanded anode exhaust providing the purge gas to be fed back into the vessel.

18. (original) The system as defined in claim 16 wherein the vessel is a rotating vessel, and wherein the expander is an isothermal expander adapted to provide electrical power for driving the rotating vessel.

19. (withdrawn) The system as defined in claim 2 wherein the hydrogen fuel cell system includes a low pressure steam stream, and wherein the steam stream provides a purge gas to be fed into the vessel.

20. (cancelled).

21. (previously presented) The system as defined in claim 48 wherein the system further comprises an expander downstream of the vessel, and wherein the expander provides a purge gas to be fed back into the vessel.

22. (original) The system as defined in claim 21 wherein the system is a hydrogen fuel cell system further comprising a fuel cell stack having an anode exhaust, the fuel cell stack disposed between the vessel and the expander, and wherein the expander expands the anode exhaust, the expanded anode exhaust providing the purge gas to be fed back into the vessel.

23. (original) The system as defined in claim 21 wherein the expander is an isothermal expander adapted to provide electrical power for driving the rotating vessel.

24. (withdrawn) The system as defined in claim 48 wherein the system includes a low pressure steam stream, and wherein the steam stream provides a purge gas to be fed into the vessel.

25. (previously presented) The system as defined in claim 48 wherein the second adsorbent is further adapted to adsorb at least one of carbon dioxide and water from the hydrogen-rich gas stream.

26. (previously presented) The system as defined in claim 25 wherein the second adsorbent is selected from the group consisting of 5A zeolite, 13X zeolite, and mixtures thereof.

27. (previously presented) The system as defined in claim 48 wherein the first adsorbent is selected from the group consisting of oxides or salts of copper impregnated or exchanged on activated carbon, alumina, and zeolites; oxides or salts of silver impregnated or exchanged on activated carbon, alumina, and zeolites; oxides or salts of tin impregnated or exchanged on activated carbon, alumina, and zeolites; and mixtures thereof.

28. (previously presented) The system as defined in claim 27 wherein, upstream of the second carbon monoxide adsorbent, the vessel comprises a layer of a desiccant material selected from the group consisting of zeolite molecular sieves, activated alumina, silica gels, and mixtures thereof.

29. (original) The system as defined in claim 7 wherein a preferential oxidizer (PROX) is eliminated from the hydrogen fuel cell system.

30. (original) The system as defined in claim 22 wherein a preferential oxidizer (PROX) is eliminated from the hydrogen fuel cell system.

31. (withdrawn) A method for removing carbon monoxide (CO) from a hydrogen-rich gas stream produced in a first reactor, the method comprising the step of passing the hydrogen-rich gas stream through a vessel which houses an adsorbent adapted to adsorb the carbon monoxide.

32. (withdrawn) The method as defined in claim 31 wherein the vessel is a rotating pressure swing adsorber.

33. (withdrawn) The method as defined in claim 32, further comprising the steps of:

pressurizing the vessel before the passing of the hydrogen-rich gas stream through the vessel;

depressurizing the vessel after the passing of the hydrogen-rich gas stream through the vessel; and

purging the vessel with a gas having a low carbon monoxide concentration.

34. (withdrawn) The method as defined in claim 31 wherein the hydrogen-rich gas stream is not passed through a preferential oxidizer (PROX).

35. (withdrawn) The method as defined in claim 31 wherein the adsorbent is a first adsorbent, and wherein the method further comprises the step of passing the hydrogen-rich gas stream through a second reactor which is a water gas shift reactor disposed between the first reactor and the vessel.

36. (withdrawn) The method of claim 35 wherein the water gas shift reactor includes a second adsorbent adapted to adsorb carbon monoxide.

37. (withdrawn) The method as defined in claim 36 wherein the second adsorbent is adapted to adsorb carbon monoxide at low temperatures and is adapted to desorb carbon monoxide at high temperatures.

38. (withdrawn) The method of claim 31 which in start-up mode comprises forming said hydrogen-rich stream by reacting a hydrocarbon fuel and air in the first reactor.

39. (withdrawn) The method of claim 38 which further includes a second reactor which is a water gas shift reactor disposed between the first reactor and the vessel.

40. (withdrawn) The method of claim 38 wherein after the start-up mode, steam is reacted along with the hydrocarbon fuel and air in the first reactor.

41. (withdrawn) A method for removing carbon monoxide from a hydrogen-rich gas stream produced in a first reactor, the method comprising the steps of:

passing the hydrogen-rich gas stream through a vessel which houses an adsorbent adapted to adsorb the carbon monoxide to provide a reduced CO content, wherein the vessel is a rotating pressure swing adsorber;

pressurizing the vessel before the passing of the hydrogen-rich gas stream through the vessel;

depressurizing the vessel after the passing of the hydrogen-rich gas stream through the vessel; and

purging the vessel with a gas having a low carbon monoxide concentration.

42. (withdrawn) The method as defined in claim 41 wherein the adsorbent is a first adsorbent, and wherein the method further comprises the step of passing the hydrogen-rich gas stream through a second reactor which is a high temperature water gas shift reactor disposed between the first reactor and the vessel, wherein the water gas shift reactor includes a second adsorbent adapted to adsorb carbon monoxide.

43. (withdrawn) The method as defined in claim 42 wherein the second adsorbent is adapted to adsorb carbon monoxide at low temperatures and is adapted to desorb carbon monoxide at high temperatures.

44. (withdrawn) The method as defined in claim 41 wherein the hydrogen-rich gas stream is not passed through a preferential oxidizer (PROX).

45. (withdrawn) The method of claim 41 which is conducted in a fuel cell system having a fuel cell stack, and wherein the hydrogen-rich gas stream having the reduced CO content is reacted in the fuel cell stack.

46. (cancelled).

47. (previously presented) The system of claim 49 comprising a vessel downstream of said water-gas shift reactor, said vessel housing a second adsorbent adapted to adsorb the carbon monoxide.

48. (currently amended) A system for removing carbon monoxide from a hydrogen-containing stream comprising:

a non-rotating shift reactor including a reaction region having an inlet and an outlet, a water gas shift catalyst disposed within said reaction region and extending to said outlet and a first carbon monoxide adsorbent disposed within

said region between said inlet and said outlet, wherein said shift reactor is adapted to receive a gas stream containing hydrogen and carbon monoxide, and wherein said first adsorbent is active to adsorb carbon monoxide at substantially ambient temperature and pressure conditions and to desorb carbon monoxide at normal shift reactor operating temperature and pressure conditions which are above said ambient temperature and pressure conditions; and

a rotating pressure swing adsorber vessel including a second carbon monoxide adsorbent in fluid communication with said outlet of said shift reactor, wherein said rotating pressure swing adsorber includes two fixed valve faces, an adsorption region, a depressurization region, a purge region, and a pressurization region.

49. (currently amended) A system comprising a non-rotating shift reactor including a reaction region having an inlet and an outlet, a water gas shift catalyst disposed within said reaction region and extending to said outlet and a carbon monoxide adsorbent disposed within said region between said inlet and said outlet, wherein said shift reactor is adapted to receive a gas stream containing hydrogen and carbon monoxide from an upstream reactor, and wherein said adsorbent is active to adsorb carbon monoxide at substantially ambient temperature and pressure conditions and to desorb carbon monoxide at normal shift reactor operating temperature and pressure conditions which are above said ambient temperature and pressure conditions.